

CLAIMS

1. An image coding method comprising:
 - dividing an input image signal into local regions;
 - deciding a quantization characteristic for each local region of the input image signal on the basis of the frequency distribution of image feature data of each local region over a predetermined period; and
 - coding the image signal.
2. An image coding method comprising:
 - dividing an input image signal into local regions;
 - deciding a filter characteristic for each local region of the input image signal on the basis of image feature data of each local region;
 - performing adaptive filtering; and
 - coding the image signal.
3. An image coding method comprising:
 - dividing an input image signal into local regions;
 - deciding a filter characteristic for each local region of the input image signal on the basis of the frequency distribution of image feature data of each local region over a predetermined period;
 - performing adaptive filtering; and

coding the image signal.

4. An image coding method as described in Claim 1, wherein employed as an input image signal is a signal obtained by dividing an input image signal into local regions, deciding a filter characteristic for each local region of the input image signal on the basis of image feature data of each local region, and subjecting the image signal to adaptive filtering.

5. An image coding method as described in Claim 1, wherein employed as an input image signal is a signal obtained by dividing an input image signal into local regions, deciding a filter characteristic for each local region of the input image signal on the basis of the frequency distribution of image feature data of each local region over a predetermined period, and subjecting the image signal to adaptive filtering.

6. An image coding method comprising:
dividing an input image signal into plural regions;
deciding a filter characteristic and a quantization characteristic for each local region of the input image signal on the basis of image feature data of each local region;
subjecting the image signal to adaptive filtering; and
coding the image signal on the basis of the quantization characteristic.

7. An image coding method comprising:
 - dividing an input image signal into local regions;
 - deciding a filter characteristic for each local region of the input image signal on the basis of image feature data of each local region;
 - subjecting the image signal to adaptive filtering;
 - deciding a quantization characteristic for each local region according to the decided filter characteristic; and
 - coding the image signal on the basis of the quantization characteristic.
8. An image coding method comprising:
 - dividing an input image signal into local regions;
 - deciding a filter characteristic and a quantization characteristic for each local region of the input image signal on the basis of the frequency distribution of image feature data of each local region over a predetermined period;
 - subjecting the image signal to adaptive filtering; and
 - coding the image signal on the basis of the quantization characteristic.
9. An image coding method comprising:
 - dividing an input image signal into local regions;
 - deciding a filter characteristic for each local region of the

input image signal on the basis of the frequency distribution of image feature data of each local region over a predetermined period;

subjecting the image signal to adaptive filtering;

deciding a quantization characteristic for each local region according to the decided filter characteristic; and

coding the image signal on the basis of the quantization characteristic.

10. An image coding method as described in any of Claims 1 to 9, wherein each of the filter characteristic and the quantization characteristic decided for each local region is compensated by comparison between itself and that obtained by averaging filter characteristics or quantization characteristics of plural local regions adjacent to the target local region.

11. An image coding method as described in any of Claims 1 to 10, wherein the image feature data of each local region is at least one of the following data: the average of absolute difference in luminance signals between adjacent pixels, the average of absolute difference in color-difference signals between adjacent pixels, the value of average luminance signal, the value of average color-difference signal, the variance of luminance signal, the variance of color-difference signal, the value representing the amount of motion, and representative vector data in color

space.

12. An image coding method as described in any of Claims 2 to 11, wherein the filter characteristic is adaptively decided according to the image feature data of each local region and a control signal supplied from the outside.

13. An image coding method as described in Claim 12, wherein the control signal supplied from the outside is at least one of the following values: the accumulated value of absolute value of frame or field pixel difference over an N (N: natural number) frame period of the input image signal, the accumulated value of quantity of coded data over an M (M: natural number) frame period, and the ratio of quantity of coded data in each frame.

14. An image coding method as described in any of Claims 1, 3, 5, 8 to 13 wherein, amongst the data used for decision of the quantization characteristic or the filter characteristic, the data of the frequency distribution of the image feature data is calculated a predetermined period before, for the image signal to be coded for each local region, in the same scene, and this operation is nullified when there is a change in the scene.

15. An image coding and decoding method for coding the image feature data of each local region as well, in an image coding

method described in any of Claims 1 to 14, further comprising:

recording a coded data sequence; and

at the time of reproduction, decoding the coded data sequence, and subjecting each local region of the decoded image signal to adaptive filtering on the basis of the image feature data of the decoded local region.

16. An image coding apparatus comprising:

local region division means for dividing an input image signal into local regions each comprising plural pixels;

first feature extraction means for extracting image feature data for each local region obtained by the local region division means;

second feature extraction means for extracting the representative value and the variance of the image feature data from the frequency distribution of the image feature data over a predetermined period;

quantization step decision means for deciding a quantization characteristic according to the data extracted by the first characteristic extraction means and the second characteristic extraction means; and

coding means for coding the input image signal divided by the local region division means, on the basis of the quantization step decided by the quantization step decision means.

17. An image coding apparatus comprising:

local region division means for dividing an input image signal into local regions each comprising plural pixels;

first feature extraction means for extracting image feature data for each local region obtained by the local region division means;

filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means;

filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means; and

coding means for coding the image signal which has been adaptively filtered for each local region by the filtering means.

18. An image coding apparatus comprising:

local region division means for dividing an input image signal into local regions each comprising plural pixels;

first feature extraction means for extracting image feature data for each local region obtained by the local region division means;

second feature extraction means for extracting the representative value and the variance of the image feature data from the frequency distribution of the image feature data over a predetermined period;

filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means and the second feature extraction means;

filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means; and

coding means for coding the image signal which has been adaptively filtered for each local region by the filtering means.

19. An image coding apparatus as described in Claim 16 comprising:

local region division means for dividing an input image signal into local regions each comprising plural pixels;

first feature extraction means for extracting image feature data for each local region obtained by the local region division means;

filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means; and

filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means;

wherein a signal which has been filtered by the filter means is used as an input image signal.

20. An image coding apparatus as described in Claim 16 comprising:

local region division means for dividing an input image signal into local regions each comprising plural pixels;

first feature extraction means for extracting image feature data for each local region obtained by the local region division means;

second feature extraction means for extracting the representative value and the variance of the image feature data from the frequency distribution of the image feature data over a predetermined period;

filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means and the second feature extraction means; and

filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means;

wherein a signal which has been filtered by the filtering means is used as an input image signal.

21. An image coding apparatus comprising:

local region division means for dividing an input image signal into local regions each comprising plural pixels;

first feature extraction means for extracting image feature

data for each local region obtained by the local region division means;

filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means;

filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means;

quantization step decision means for deciding a quantization characteristic according to the data extracted by the first feature extraction means; and

coding means for coding the image signal which has been adaptively filtered for each local region by the filtering means, on the basis of the quantization step decided by the quantization step decision means.

22. An image coding apparatus comprising:

local region division means for dividing an input image signal into local regions each comprising plural pixels;

first feature extraction means for extracting image feature data for each local region obtained by the local region division means;

filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means;

filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means;

quantization step decision means for deciding a quantization characteristic according to the data decided by the filter characteristic decision means; and

coding means for coding the image signal which has been adaptively filtered for each local region by the filtering means, on the basis of the quantization step decided by the quantization step decision means.

23. An image coding apparatus comprising:

local region division means for dividing an input signal into local regions each comprising plural pixels;

first feature extraction means for extracting image feature data for each local region obtained by the local region division means;

second feature extraction means for extracting the representative value and the variance of the image feature data from the frequency distribution of the image feature data over a predetermined period;

filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means and the second feature extraction means;

filtering means for subjecting the image signal to adaptive

filtering on the basis of the filter characteristic decided by the filter characteristic decision means;

quantization step decision means for deciding a quantization characteristic according to the data extracted by the first feature extraction means and the second feature extraction means; and

coding means for coding the image signal which has been adaptively filtered for each local region by the filtering means, on the basis of the quantization step decided by the quantization step decision means.

24. An image coding apparatus comprising:

local region division means for dividing an input signal into local regions each comprising plural pixels;

first feature extraction means for extracting image feature data for each local region obtained by the local region division means;

second feature extraction means for extracting the representative value and the variance of the image feature data from the frequency distribution of the image feature data over a predetermined period;

filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means and the second feature extraction means;

filtering means for subjecting the image signal to adaptive

filtering on the basis of the filter characteristic decided by the filter characteristic decision means;

quantization step decision means for deciding a quantization characteristic according to the data decided by the filter characteristic decision means; and

coding means for coding the image signal which has been adaptively filtered for each local region by the filtering means, on the basis of the quantization step decided by the quantization step decision means.

25. An image coding apparatus as described in any of Claims 16 to 24, wherein each of the filter characteristic and the quantization characteristic which are decided for each local region by the filter characteristic decision means and the quantization step decision means, respectively, is compensated by comparison between itself and that obtained by averaging the filter characteristics or the quantization characteristics of plural local regions adjacent to the target local region.

26. An image coding apparatus as described in any of Claims 16 to 25, wherein the data extracted by the first feature extraction means is at least one of the following data: the average of absolute difference in luminance signals between adjacent pixels, the average of absolute difference in color-difference signals between adjacent pixels, the average luminance value, the average

color-difference value, the variance of luminance signal, the variance of color-difference signal, the value representing the amount of motion, and the representative vector data in color space.

27. An image coding apparatus described in any of Claims 17 to 26, wherein the filter characteristic decision means adaptively decides the filter characteristic according to a control signal supplied from the outside as well as the data extracted from the first feature extraction means and the second feature extraction means.

28. An image coding apparatus as described in Claim 27, wherein the control signal supplied from the outside is at least one of the following values: the accumulated value of absolute value of frame or field pixel difference over an N (N: natural number) frame period of the input image signal, the accumulated value of quantity of coded data over an M (M: natural number) frame period, and the ratio of quantity of coded data in each frame.

29. An image coding apparatus as described in any of Claims 16, 18 to 20, and 23 to 28, wherein the data of the second feature extraction means to be input to the quantization step decision means or to the filter characteristic decision means is a predetermined period delayed from the data of the first feature

extraction means in the same scene, and this operation is nullified when there is a change in the scene.

30. An image recording and reproduction apparatus for quantizing and coding the input image signal divided into the local regions, and coding at least one of the data extracted by the first and second feature extraction means, in the coding means included in the image coding apparatus described in any of Claims 16 to 29, said apparatus further comprising:

recording means for recording a coded data sequence obtained by the coding means;

reproduction means for reproducing the coded data sequence recorded by the recording means;

decoding means for decoding the data extracted by the first or second feature extraction means and the quantized and coded image signal after separating them from the coded data sequence reproduced by the reproduction means, thereby obtaining the decoded feature data and the decoded image signal; and

filtering means for subjecting each local region of the decoded image signal to adaptive filtering on the basis of the decoded feature data.

31. An image coding method comprising:

deciding a local quantization characteristic of an input image signal on the basis of image feature data of the input

image signal for a predetermined period and the local image feature data of the input image signal; and
coding the image signal.

32. An image coding method comprising:

deciding a local filter characteristic of an input image signal on the basis of image feature data of the input image signal for a predetermined period and the local image feature data of the input image signal;

subjecting the image signal to adaptive filtering; and
coding the image signal.

33. An image coding method as described in any of Claims 31 and 32, wherein the image feature data is at least one of the following data: the average luminance level, the representative vector data in the color space, and the luminance variance.

34. An image coding method as described in Claim 33, wherein the representative vector data in the color space is the data of average of each of the two color-difference signals possessed by pixels.

35. An image coding method as described in any of Claims 31, 33 and 34, wherein the local quantization characteristic of the input image signal is decided on the basis of a difference

between the image feature data of the input image signal for the predetermined period and the local image feature data of the input image signal, and then the image signal is coded.

36. An image coding method as described in any of Claims 2, 33 and 34, wherein the local filter characteristic of the input image signal is decided on the basis of the image feature data of the input image signal for the predetermined period and the local image feature data of the input image signal, and the image signal is subjected to adaptive filtering, followed by coding.

37. An image coding method as described in any of Claims 33 and 34, wherein the local filter characteristic of the input image signal is decided on the basis of a difference between the image feature data of the input image signal for the predetermined period and the local image feature data of the input image signal and on the luminance variance for the predetermined period, and the image signal is subjected to adaptive filtering, followed by coding.

38. An image coding method as described in Claim 33, wherein the representative vector data in the color space is the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range.

39. An image coding method as described in Claim 33, wherein the representative vector data in the color space is decided according to the data of average of each of the two color-difference signals possessed by pixels, and the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range.

40. An image coding method as described in any of Claims 38 and 39, wherein the predetermined range in the color space is a region representing the skin color.

41. An image coding apparatus comprising:

blocking means for dividing an input image signal into blocks each comprising plural pixels;

first feature extraction means for extracting a local feature for each divided block obtained by the blocking means, and second feature extraction means for extracting a feature from the input image signal for every predetermined period;

quantization step decision means for deciding a quantization characteristic according to the respective data extracted by the first feature extraction means and the second feature extraction means; and

coding means for coding the input image signal blocked by

the blocking means, on the basis of the quantization step decided by the quantization step decision means.

42. An image coding apparatus comprising:

blocking means for dividing an input image signal into blocks each comprising plural pixels;

first feature extraction means for extracting a local feature for each divided block obtained by the blocking means;

second feature extraction means for extracting a feature from the input image signal for every predetermined period;

filter characteristic decision means for deciding a filter characteristic according to the respective data extracted by the first feature extraction means and the second feature extraction means;

filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means; and

coding means for coding the image signal which has been adaptively filtered for each block by the filtering means.

43. An image coding apparatus as described in any of Claims 41 and 42, wherein the data extracted by the first feature extraction means and the second feature extraction means are at least one of the following data: the average luminance level, the representative vector data in the color space, and the luminance

variance.

44. An image coding apparatus as described in Claim 43, wherein the representative vector data in the color space is the data of average of each of the two color-difference signals possessed by pixels.

45. An image coding apparatus as described in any of Claims 41, 43 and 44, wherein said quantization step decision means decides the quantization step according to a difference between the data extracted by the first feature extraction means and the data extracted by the second feature extraction means.

46. An image coding apparatus as described in any of Claims 42, 43, and 44, wherein said filter characteristic decision means decides the filter characteristic according to a difference between the data extracted by the first feature extraction means and the data extracted by the second feature extraction means.

47. An image coding apparatus as described in any of Claims 43 and 44, wherein said filter characteristic decision means decides the filter characteristic according to a difference between the data extracted by the first feature extraction means and the data extracted by the second feature extraction means, and the luminance variance for every predetermined period.

48. An image coding apparatus as described in Claim 43, wherein the representative vector data in the color space is the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range.

49. An image coding apparatus as described in Claim 43, wherein the representative vector data on the color space is decided according to the data of average of each of the two color-difference signals possessed by pixels, and the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined period.

50. An image coding apparatus as described in any of Claims 48 and 49, wherein the predetermined range in the color space is a region representing the skin color.

51. An image coding method as described in Claim 11, wherein the representative vector data in the color space is the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range.

52. An image coding method as described in Claim 11, wherein the representative vector data in the color space is decided according to the data of average of each of the two color-difference signals possessed by pixels, and the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range.

53. An image coding method as described in any of Claims 51 and 52, wherein the predetermined range in the color space is a region representing the skin color.

54. An image coding apparatus as described in Claim 26, wherein the representative vector data in the color space is the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range.

55. An image coding apparatus as described in Claim 26, wherein the representative vector data in the color space is decided according to the data of average of each of the two color-difference signals possessed by pixels, and the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range.

56. An image coding apparatus as described in any of Claims 54 and 55, wherein the predetermined range in the color space is a region representing the skin color.